CLAIMS

What is claimed is:

1. A method for treating a disorder associated with a cellular or tissue structure or the accumulation of an undesirable biological material in a subject comprising administering to the subject one or more magnetic particles, wherein at least one particle localizes at or within the structure or material, and wherein the treatment is carried out by applying a magnetic field, to induce at least one particle to rotate, to thereby disrupt the structure or material, wherein at least one magnetic particle has intrinsic magnetization, said magnetization being stabilized by inherent magnet crystalline anisotropy and/or by shape anisotropy.

2. The method of claim 1, wherein the structure is a mammalian cell.

3. The method of claim 1, wherein the structure is a tumor.

4. The method of claim 1, wherein at least one particle comprises a targeting moiety.

5. The method of claim 4, wherein the targeting moiety is an antibody.

6. The method of claim 5 wherein the antibody is a cell-internalizing antibody.

7. The method of claim 1, wherein at least one particle comprises a magnetic material with a magneto-crystalline anisotropy of at least 1×10^5 J/m^3.

8. The method of claim 7, wherein the magnetic material is a rare-earth metal alloy or a crystalline hexaferrite.

9. The method of claim 1, wherein at least one particle comprises a coating of a bio-compatible material.

10. The method of claim 7, wherein the magnetic material of at least one particle is of a maximum dimension of from 50 nm to 500 nm.

11. The method of claim 1, wherein at least one particle has a total maximum dimension not exceeding 200 nm.

12. The method of claim 1, wherein one or more particles is a shape selected from the group consisting of: substantially cuboid, substantially oblate spheroid and substantially prolate spheroid.

13. A method for disrupting a material, comprising the steps of:

(i) localizing one or more magnetic particles at or within the material:

and

(ii) applying a magnetic field to one magnetic particle, to induce particle rotation and thereby disrupt the material, wherein one magnetic particle has intrinsic magnetization, said magnetization being stabilized by inherent magneto-crystalline anisotropy

and/or by shape anisotropy and wherein the applied magnetic field direction and/or amplitude with respect to the material is varied over time.

14. The method of claim 13, wherein the material is a biological material.

15. The method of claim 13, wherein the material is a cellular or tissue structure.

16. The method of claim 13, wherein the material is a mammalian cell.

17. The method of claim 13, wherein the material is a tumor.

18. The method of claim 13, wherein the method is performed *in vitro*.

19. The method of claim 13, wherein at least one particle comprises a targeting moiety.

20. The method of claim 19, wherein the targeting moiety is an antibody.

21. The method of claim 20, wherein the antibody is a cell-internalizing antibody.

22. The method of claim 13, wherein the at least one particle comprises a magnetic material with a magneto-crystalline anisotropy of at least 1×10^5 J/m^3.

23. The method of claim 22, wherein the magnetic material is a rare-earth metal alloy or a crystalline hexaferrite.

24. The method of claim 13, wherein at least one particle comprises a coating of a bio-compatible material.

25. The method of claim 22, wherein the magnetic material of at least one particle is of a maximum dimension of from 50 nm to 500 nm.

26. The method of claim 13, wherein at least one particle has a total maximum dimension not exceeding 200 nm.

27. The method of claim 13, wherein one or more particles is a shape selected from the group consisting of: substantially cuboid, substantially oblate spheroid and substantially prolate spheroid.

28. The method of claim 13, wherein the applied magnetic field has a flux density of from 0.01 to 2 Tesla.

29. The method of claim 13, wherein the magnetic field variation is continuous.

30. The method of claim 13, wherein the variation is discontinuous, the magnetic field being repeatedly applied after re-orienting the material.

31. The method of claim 13, wherein the variation is discontinuous, the magnetic field being repeatedly applied after a predetermined wait period to allow the magnetic axis of at least one particle to take up a random direction as a result of Brownian motion.

32. The method of claim 13, wherein the variation is achieved by suitably controlling an external magnetic field generator.

33. The method of claim 13, wherein the field direction is varied at a frequency up to 100 Hz.

34. The method of claim 13, wherein the variation is achieved by moving the material.

35. The method of claim 13, wherein the material is rotated at a frequency up to 10 Hz.

36. The method of claim 13, further comprising obtaining a magnetic resonance image of at least one particle prior to causing movement of at least one particle.

37. An apparatus for disrupting a material, the apparatus comprising a magnetic field generator for generating a magnetic field in a working volume; one or more magnetic particles localized at or in the material in the working volume, wherein at least one magnetic particle has intrinsic magnetization, said magnetization being stabilized by inherent magneto-crystalline anisotropy and/or by shape anisotropy; and a control system for causing a change in the magnetic field in the working volume with respect to the material so as to rotate the magnetic particle.

38. The apparatus of claim 37, wherein the control system causes a relative movement between the magnetic field direction and the material.

39. The apparatus of claim 38, wherein the control system causes a relative rotation between the magnetic field direction and the working volume.

40. The apparatus of claim 37, wherein the control system is adapted to cause the magnetic field vector in the working volume to change with respect to the material in amplitude or direction or both.

41. The apparatus of claim 40, wherein the control system is adapted to cause the magnetic field generator to change relative to the material.

42. The apparatus of claim 37, wherein the control system is adapted to cause the magnetic field generator to pulse the amplitude of the magnetic field in the working volume.

43. The apparatus of claim 37, wherein the working volume is located externally of the magnetic field generator.

44. The apparatus of claim 37, wherein the magnetic field generator comprises one or more electromagnets.

45. The apparatus of claim 44, wherein at least one electromagnet is fabricated from a high temperature superconductor.

46. The apparatus of claim 37, wherein the magnetic field generated by the magnetic field generator has a field strength in the range 0.01 to 2 Tesla.

47. The apparatus of claim 37, wherein at least one particle comprises a targeting moiety.

48. The apparatus of claim 47, wherein the targeting moiety is an antibody.

49. The apparatus of claim 48, wherein the antibody is a cell-internalizing antibody.

50. The apparatus of claim 37, wherein at least one particle comprises a magnetic material with a magneto-crystalline anisotropy of at least 1×10^5 J/m^3.

51. The apparatus of claim 50, wherein the magnetic material is a rare-earth metal alloy or a crystalline hexaferrite.

52. The apparatus of claim 37, wherein at least one particle comprises a coating of a bio-compatible material.

53. The apparatus of claim 50, wherein the magnetic material of at least one particle is of a maximum dimension of from 50 nm to 500 nm.

54. The apparatus of claim 37, wherein at least one particle has a total maximum dimension not exceeding 200 nm.

55. The apparatus of claim 37, wherein one or more particles is a shape selected from the group consisting of: substantially cuboid, substantially oblate spheroid and substantially prolate spheroid.

56. A composition comprising a plurality of the magnetic particles of claim 4, and optionally, a pharmaceutically acceptable buffer, excipient or diluent.

57. A composition comprising a plurality of the magnetic particles of claim 5, and optionally, a pharmaceutically acceptable buffer, excipient or diluent.

58. A composition comprising a plurality of the magnetic particles of claim 6, and optionally, a pharmaceutically acceptable buffer, excipient or diluent.

59. A composition comprising a plurality of the magnetic particles of claim 7, and optionally, a pharmaceutically acceptable buffer, excipient or diluent.

60. A composition comprising a plurality of the magnetic particles of claim 8, and optionally, a pharmaceutically acceptable buffer, excipient or diluent.

61. A composition comprising a plurality of the magnetic particles of claim 9, and optionally, a pharmaceutically acceptable buffer, excipient or diluent.

62. A composition comprising a plurality of the magnetic particles of claim 10, and optionally, a pharmaceutically acceptable buffer, excipient or diluent.

63. A composition comprising a plurality of the magnetic particles of claim 11, and optionally, a pharmaceutically acceptable buffer, excipient or diluent.

64. A composition comprising a plurality of the magnetic particles of claim 12, and optionally, a pharmaceutically acceptable buffer, excipient or diluent.

65. A composition according to claim 40, for therapeutic use.

66. The method of claim 1, wherein the particle is to be rotated to exert a force of at least 100 pN.

67. The method of claim 13, wherein the particle is to be rotated to exert a force of at least 100 pN.

No additional fee is required by this Preliminary Amendment. In the event that a fee is due, the Commissioner is hereby authorized to charge payment of any fees associated with this application or credit any overpayments to Deposit Account No. 50-1698.

Respectfully submitted,

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Date

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